D-980M

Stereo cassette tape deck

1451

Operating guide

BEFORE USING

To obtain the best performance and ensure years of trouble-free use, please read this operating guide carefully.

KEY TO ILLUSTRATIONS

① RECORD INDICATOR
② PLAYBACK INDICATOR
③ PAUSE INDICATOR
④ 3-HEAD INDICATOR
⑤ TAPE COUNTER
⑥ COUNTER RESET BUTTON
⑦ AUTO-REWIND SWITCH
⑧ BIAS FINE ADJUSTMENT KNOB
⑨ MEMORY SWITCH
⑩ LEVEL METER (LEFT)
⑪ PEAK INDICATORS
⑫ LEVEL METER (RIGHT)
⑬ D.C.C.S. CONTROLS
⑭ OUTPUT LEVEL CONTROL
⑮ RECORDING LEVEL CONTROLS (MIC/DIN)
⑯ RECORDING LEVEL CONTROLS (LINE)
⑰ MONITOR SWITCH
⑱ DOLBY NR SWITCH/MPX FILTER SWITCH
⑲ TAPE SELECT SWITCH (EQUALIZER)
⑳ TAPE SELECT SWITCH (BIAS)
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㉒ REC MUTE BUTTON
㉓ PAUSE BUTTON
㉔ STOP BUTTON
㉕ FAST FORWARD BUTTON
㉖ PLAYBACK BUTTON
㉗ REWIND BUTTON
㉘ RECORD BUTTON
㉙ HEADPHONE SOCKET
㉚ MICROPHONE SOCKET (RIGHT)
㉛ MICROPHONE SOCKET (L/mono)
㉜ POWER (MAINS) SWITCH
㉝ RECORD/PLAYBACK (DIN) SOCKET
㉞ LINE-IN SOCKETS
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㊱ DIN MONITOR SOCKET
㊲ OUTPUT SWITCH
㊳ REMOTE CONTROL SOCKET
㊴ METAL TAPE SWITCH
㊵ METAL INDICATOR
㊶ TIMER SWITCHES
㊷ VOLTAGE SELECTOR
㊸ CONNECTIONS
㊹ CASSETTE MAINTENANCE
㊺ CLEANING

* Noise reduction system manufactured under license from Dolby Laboratories.
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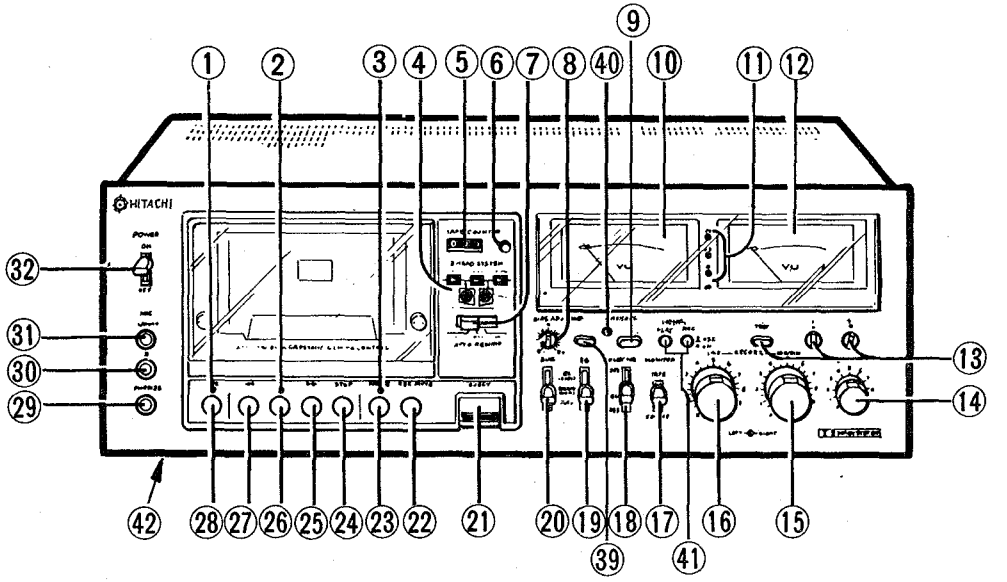
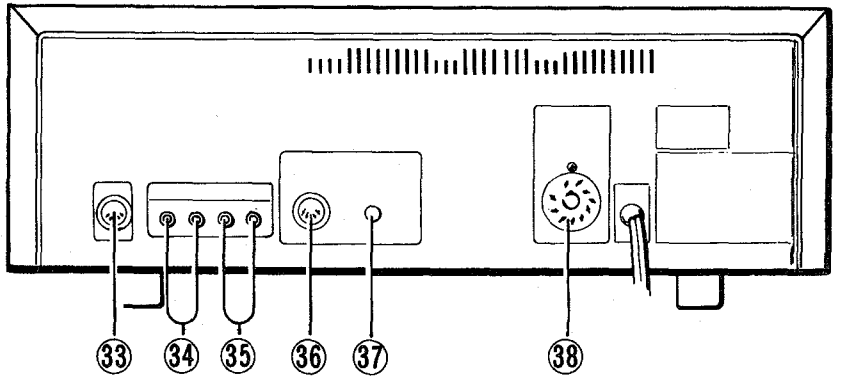
D-980M

HITACHI





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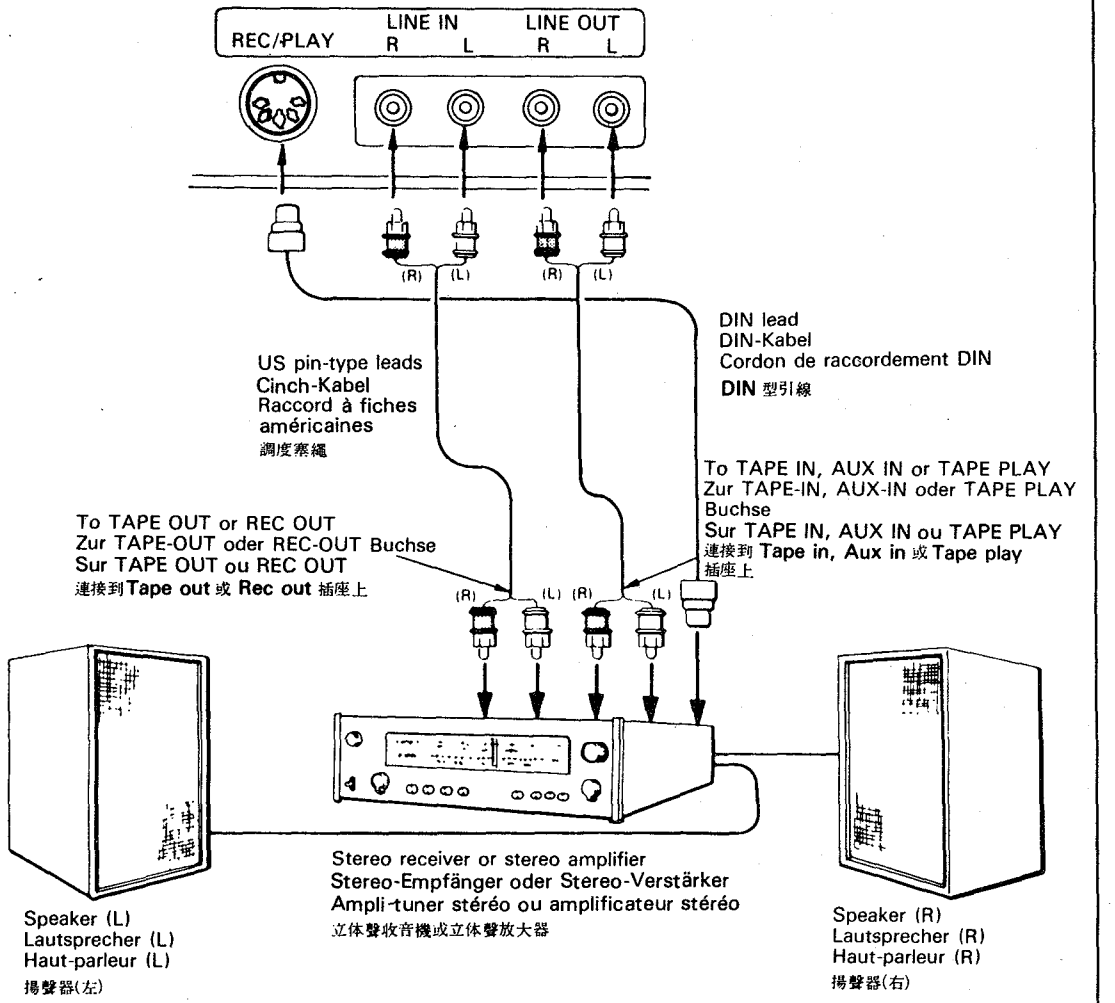
REC/PLAY
LINE IN
R L
LINE OUT
R L
(R) (L) (R) (L)
DIN lead
DIN-Kabel
Cordon de raccordement DIN
DIN 型引線
US pin-type leads
Cinch-Kabel
Raccord à fiches américaines
調度塞繩
To TAPE IN, AUX IN or TAPE PLAY
Zur TAPE-IN, AUX-IN oder TAPE PLAY Buchse
Sur TAPE IN, AUX IN ou TAPE PLAY
連接到 Tape in, Aux in 或 Tape play 插座上
To TAPE OUT or REC OUT
Zur TAPE-OUT oder REC-OUT Buchse
Sur TAPE OUT ou REC OUT
連接到 Tape out 或 Rec out 插座上
(R) (L) (R) (L)
Stereo receiver or stereo amplifier
Stereo-Empfänger oder Stereo-Verstärker
Ampli-tuner stéréo ou amplificateur stéréo
立体聲收音機或立体聲放大器
Speaker (L)
Lautsprecher (L)
Haut-parleur (L)
揚聲器(左)
Speaker (R)
Lautsprecher (R)
Haut-parleur (R)
揚聲器(右)

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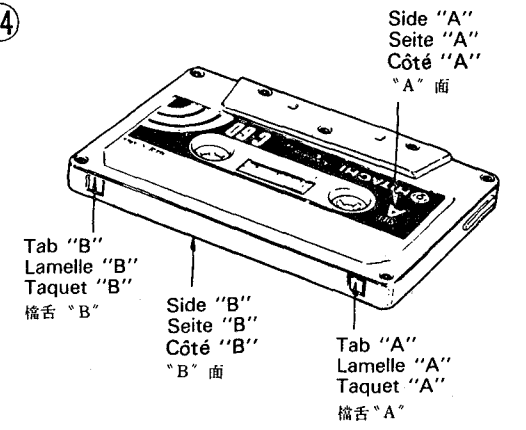
Side "A"
Seite "A"
Côté "A"
"A" 面
Tab "B"
Lamelle "B"
Taquet "B"
檔舌 "B"
Side "B"
Seite "B"
Côté "B"
"B" 面
Tab "A"
Lamelle "A"
Taquet "A"
檔舌 "A"

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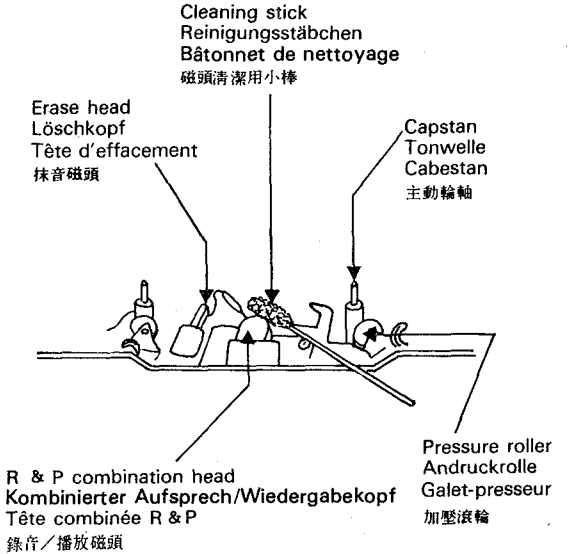

Cleaning stick
Reinigungsstäbchen
Bâtonnet de nettoyage
磁頭清潔用小棒
Erase head
Löschkopf
Tête d'effacement
抹音磁頭
Capstan
Tonwelle
Cabestan
主動輪軸
R & P combination head
Kombinierter Aufsprech/Wiedergabekopf
Tête combinée R & P
錄音／播放磁頭
Pressure roller
Andruckrolle
Galet-presseur
加壓滾輪

PRECAUTIONS

- This unit is designed so that other units can be stacked on it, but do not stack extremely heavy objects on it.
- Never use any strong detergent or solvent for cleaning the cabinet of this unit, because it could lead to damage of the surface finish.
- Protect the unit against excessive heat (e.g. direct sunshine), dust, shock hazards and moisture.
- Be sure not to open the cabinet.
- Be careful not to damage the power (mains) lead. Be sure to hold the plug when pulling it out; do not pull the lead.
- Disconnect the AC power (mains) lead plug from the AC outlet when the unit is not to be used for a long period of time or you are away from home.
- When using with other components, any component which can produce induction noise which can induce hum should be as far as possible from this deck. Bias leakage from this deck during recording may cause beats during reception of AM broadcasts, so be careful in placement of this deck with respect to the tuner; when beats occur, move them away from each other if possible. There is no problem in FM reception.

FEATURES

- **Uni-torque Motor/DC motor**
  A brushless, coreless, slotless uni-torque motor is used to drive the capstans and a DC motor is used to drive the reels; this system assures accurate speed and keeps wow and flutter down to the amazingly low figure of 0.03% (WRMS).
- **Smooth Operation by means of the logic control**
  Light feather-touch operation has been made possible by use of logic control with 2 motors, 2 solenoids, and one chip IC.
  It is possible to change directly from the PLAY mode to the Fast Forward or Rewind mode and vice-versa without damaging the tape.
- **Auto-rewind play/auto-rewind stop functions**
  The control circuit is operated by means of reed switch at the end of the tape to rewind the tape to automatically enter the play mode (Auto-rewind play) or to enter the stop mode (Auto-rewind stop) after rewinding the tape.
  It is very convenient because the tape can be returned to the tape start position after it has been listened to or after recording.
- **1.4 mm close-gap metal R & P heads compatible with Metal Tape**
  A newly-developed high density ferrite 1.4 mm close-gap metal R & P heads which can generate sufficient magnetic field strength for the high retentivity of Metal Tape,is used. In addition to this, a special double-structure double-gap metal erase head made of a special permalloy with high hardness and magnetic permeability is employed to completely erase high retentivity Metal Tape.
  As a result, the superb characteristics of Metal Tape — high frequency response, enlargement of the dynamic range at high frequencies, reduction of distortion at high input levels and sharp improvement of the S/N ratio at high frequencies — are realized.
- **With Metal Tape switch**
  The metal position switch for use with Metal Tape fully displays the performance of this new tape.

- **Double Dolby* Noise Reduction system**
  The Dolby Noise Reduction system reduces tape hiss by up to 10 dB without any deterioration in tape sound reproduction characteristics to yield a good S/N ratio in recording and playback.
  Since this deck is of the 3-head type, 2 Dolby NR circuits are built-in, one for recording and one for playback.

- **D.C.C.S. (Dolby Calibration Control System)**
  D.C.C.S. is composed of a test signal oscillator and a recording sensitivity volume control. This permits the adjustment of the recording level to maintain correct Dolby tracking. The playback levels for proper Dolby Noise Reduction operation are standardized, but the recording sensitivity of cassette tapes may vary. It is necessary to provide a means of achieving standard recording levels so that the Dolby Noise Reduction system does not emphasize or reduce the proper high frequency response.

- **Rec. mute button**
  When this button is pressed during recording, the signal is cut although the tape continues running, so breaks in a narration or music can be made easily.

- **Remote control operation**
  Remote control operation is possible using the optional remote control device (RB-2000).

- **Timer mechanism for unattended recording and alarm playback**
  With an external audio timer connected, automatic recording and waking up to music in place of an alarm at any desired time is possible.

POWER (MAINS) REQUIREMENT

To Set Power (Mains) Voltage:

1. This unit can be used with a power (mains) voltage of 100 to 110V, 115 to 127V, 200 to 220V or 230 to 250V. Before operating, be sure to check your local power (mains) voltage.
2. Turn the Voltage selector to your desired power (mains) voltage with a screw-driver until the selector clicks.

Notes:
1. Before turning the selector, disconnect the AC power (mains) lead from the AC outlet with this unit in stop mode.
2. Be sure not to turn the selector with a thin screw-driver, etc. by force. The selector may be broken and the deck will not operate.
3. When inserting the mains plug into the AC outlet supplying 100 — 110/115 — 127V, insert the plug with Siemens adaptor connected to it.

CONNECTIONS

This unit is not equipped with a built-in power amplifier; therefore it must be connected to a playback unit (stereo amplifier). The connection should preferably be done using the US-pin type sockets ㉞ and ㉟ . If the stereo unit is not provided with US-pin type sockets, perform the connection via DIN socket ㉝ . (See diagram ㊸).
Note: Do not use the DIN lead and US pin-type leads at the same time.

Insert the AC power (mains) lead plug into the power (mains) socket of your stereo amplifier or into convenient AC outlet.
Note: disconnect the AC power (mains)lead plug from the AC outlet when the unit is not to be used with AC power (mains) for a long period of time or you are away from home.

TAPE SELECT SWITCHES

Equalizer and bias can be changed over independently. When using ferric oxide tape (Fe_2O_3), set the Bias and Equalizer to the "UD-ER (NOR)" position; when using chrome oxide tape (CrO_2), set the Bias and Equalizer to the "UD-EX (CrO_2)" position; when using ferrichrome tape (FeCr), set the Bias and Equalizer to the "FeCr" position.
By setting these switches in accordance with the various types of tape available, full tape performance of the tape can be obtained.

To obtain the best performance from this unit, it is recommended that you use the tapes: HITACHI UDER (Normal position) and HITACHI UDEX (CrO_2 position).
A high recording level with a wide dynamic range can be obtained.

Metal Tape switch

Turn this switch ON only when using the Metal Tape. Be sure to set to OFF when metal tape is not being used. (Be careful; when the Metal position switch is ON, the tape select switches do not work whatever their positions.)

Cautions on the use of Metal Tape

1. Some Metal Tape is incompletely coated with magnetic powder which causes level fluctuation, so it is recommended to clean the head, capstan and pinch-roller after it is used several times. (When cleaning, be careful not to apply too much force to the head because it may cause the high frequency characteristics to deteriorate.)
2. Metal Tape recorded on this deck can be played back on other decks which do not have Metal tape switch. In this case, set the tape selector to CrO_2 or FeCr for playback.

OUTPUT LEVEL CONTROL

The output level should be adjusted by use of the output level control ⑭, in order to match the input sensitivity of the power amplifier to which the unit is connected.

DOLBY NR (Noise Reduction) SWITCH/MPX FILTER SWITCH

ON/MPX OFF: Set to this position when playing back or recording the broadcasting except an FM stereo through a Dolby NR system, or playing back cassette tapes recorded through a Dolby NR system.

ON: Set to this position when recording an FM stereo broadcasting utilizing a Dolby NR system.

OFF: Set to this position when playing back cassette tapes not recorded through a Dolby NR system or making a recording not utilizing a Dolby NR system.

RECORDING LEVEL CONTROLS

Recording level can be controlled in proportion to the input volume by these controls.
RECORDING LEVEL CONTROLS (MIC/DIN) ⑮: Control the recording level by these controls when recording from the Microphone sockets ㉚ and ㉛ or the Record/playback (DIN) socket ㉝ .
RECORDING LEVEL CONTROLS (LINE) ⑯: Control the recording level by these controls when recording from the Line in sockets ㉞.

BIAS FINE ADJUSTMENT KNOB (BIAS ADJ)
Fine-adjust with this knob after the tape selector switch is set during recording.
Refer to the diagram, "Bias fine adjustment knob" on Page 9 for Adjustment method.

AUTO-REWIND SWITCH
This switch selects the tape mode at the end of tape.
STOP: During recording or playing, the tape is automatically rewound to the tape start and the deck enters the STOP mode.
OFF: The tape automatically stops after recording or playback.
PLAY: The tape is rewound to the tape start and when rewinding is completed, the tape enters the PLAY mode, for playback.

REC. MUTE BUTTON
When this button is pressed during recording, the signal is cut although the tape continues running, interrupting the narration or leaving a gap between passages of music.

HEADPHONES
Connect headphones to the Headphone socket ㉙ to monitor the recording or to enjoy the playback material with stereo headphones.

OUTPUT SWITCH
When connected with a stereo system, and when recording terminal (REC OUT) and playback terminal (TAPE IN) are both connected electrically or when recording with DIN Lead, abnormal oscillations may occur because of the wiring of the stereo system connected.
ON: When connected with a stereo system which causes no abnormal oscillations.
OFF: When abnormal oscillations occur.

DIN MONITOR SOCKET
To monitor when recording with a DIN lead, connect an extra optional DIN lead to this socket.

MONITOR SWITCH
Since this unit uses the 3-head system, the recorded signal can be heard immediately after recording.
TAPE: The sound recorded on a tape comes out to the Line out sockets ㉟ , Headphone socket ㉙ and Record/Playback (DIN) socket ㉝ via the playback amplifier. This monitoring on the "TAPE" side is a monitor system which only a 3-head system can give; with the sound actually recorded being monitored.
Note: Be sure to set the switch to "TAPE". When it is set to "SOURCE", the sound recorded on the tape does not come out.
SOURCE: The sound can be monitored before being recorded on the tape.

3-HEAD INDICATOR
This 3-head indicator uses a convenient lamp device which allows the internal operation route of this unit to be seen at a glance. For example, when the Monitor switch ⑰ is set to "TAPE" while in the recording mode, the input signal flows to the recording head (REC) from the input amplifier (INPUT) and is recorded; the signal on the tape is immediately played back by the playback head (PLAY) and output to the

LINE OUT via the output amplifier (OUTPUT). The actual recording monitor route, which is a feature of the 3-head system, is indicated with a lamp. The recording operation route while the Monitor switch ⑰ is at "SOURCE" or the internal playback operation route when the Monitor switch ⑰ is set to "SOURCE"/"TAPE" during playback operation, are indicated by lamps, respectively; therefore, the signal route can easily be confirmed.

REMOTE CONTROL SOCKET

By connecting the remote controller (Optional extra) to the Remote control socket ㊳ , the movement of the tape can be controlled by this controller.

DOLBY CALIBRATION CONTROLS (Method of adjustment)

1. Insert the cassette tape to be used.
2. Set the Tape selector switches ⑲ and ⑳ to match the cassette tape. Set the Dolby noise reduction switch OFF.
3. Depress the Record button ㉘ and the Playback button ㉖ to put the deck in the recording mode. Set the Monitor switch ⑰ at SOURCE, depress the DCCS control ⑬ (TEST), then adjust the Recording level control ⑯ so that the pointer of the level meters indicate 0 dB.
4. Set the monitor switch ⑰ to TAPE and adjust the DCCS controls ⑬ of both left/right channels so that the pointer of the level meter indicates 0 dB.
5. Dolby calibration is now finished. Remove your finger from the DCCS control ⑬ , and set the Dolby noise reduction switch ⑱ to ON and start recording.
   The Dolby circuit will now operate in ideal condition.

* Although it is ideal to change calibration every time the tape used is changed, in adjustment no trouble occurs actually if it is used in the same condition as when it was shipped from the factory, therefore do not touch DCCS control ⑬ if you find it troublesome.

MEMORY SWITCH

Set the reset button of the Tape counter ⑤ at "000" when starting the recording by depressing the reset button at the side of the Tape counter ⑤ , and rewind with this switch ⑨ set at ON after finishing the recording.

Rewinding stops automatically at the beginning of recording and tape-heading can be done when the counter shows around "999 – 997".
The memory feature can also be used to repeat one selection.
Reset at the start of the selection.
Turn memory off for full rewind of cassette.

TIMER SWITCHES (TIMER)

Set these switches to OFF when a timer is not used.
Press REC or PLAY switch for recording when you are absent or for timer PLAY. (Refer to "Recording and playback using a timer" on Page 10 for details.)

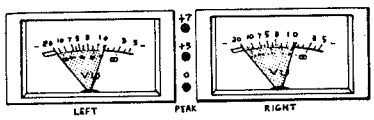
CASSETTE INSERTION

When the Eject button ㉑ is pressed, the cassette holder comes out toward you gradually. Insert the cassette with the exposed tape downward until it is locked, then close the cassette holder.
For cassette removal, press the Eject button ㉑ with the unit in the STOP mode; the cassette holder opens toward you for easy removal.
When the cassette is fully recorded or played back, it may be turned over to side 2 (or B) for an equal time of recording or playback.

RECORDING

Recording from a stereo system

1. Connect this unit and the stereo system using the pinjack connection cords.
2. Set the power switch ㉜ to ON, insert the cassette with the side to be recorded toward you and close the cassette holder.
3. Set the Tape select switches ⑲ and ⑳ matching them to the tape to be recored.
   Turn the Metal tape switch ㊴ ON only when using the Metal Tape.
   Be sure to set this switch to OFF when Metal Tape is not being used.
   Be careful: when the metal tape switch is ON, the tape select switches ⑲ , ⑳ do not work whatever their positions.
4. Adjust the bias fine adjustment knob ⑧ to match the tape.
5. Set the Dolby noise reduction/MPX filter switch ⑱ to match the source to be recorded.
   (Set to "ON" for FM stereo recording and to "ON/MPX OFF" otherwise. Set to "OFF" to record without using the DOLBY circuit).
6. Set the Auto-rewind switch ⑦ to the desired position (Refer to Auto-rewind switch") and press the reset button of tape counter ⑥ so that the reading is " 000 ".
7. When the Pause button ㉓ is pressed while pressing the Record button ㉘ , it enters the recording Stand-by mode. Observe the VU meters and peak indicators under this condition, and adjust the recording level.
   The optimum recording level is shown in the diagram below.
   Note: Reduce the mic (MIC) volume to the "0" position when not mixing recording from the microphone. Recording with reduced noise can be done.



Swinging within this range shows it is the optimum level.

Adjust the recording level so that +3 peak indicator lights occasionaly.

8. Start recording by pressing the PLAY Button ㉖ .
9. Press the Pause button ㉓ to stop the tape temporarily during recording. When the Playback button ㉖ is pressed, recording starts.
10. Press the REC. MUTE button ㉒ to cut the sound being recordd. The input is cut while the button is pressed and restarts when the button is released. (Use the pause button ㉓ when the narration is too long, etc.).
11. Press the STOP button ㉔ when the recording is completed.
    When the recording is done up to the end of tape, operation is according to the position of the auto-rewind switch ⑦.

Caution: Do not set the power switch ㉜ ON/OFF abruptly during recording as it may cause mis-operation.

Recording from microphone

Insert two microphones into the microphone sockets ㉚ and ㉛ .
Carry out the following procedure for recording from a stereo system.
For monaural recording, connect one microphone plug to microphone socket ㉛ marked L/mono.
Note: Adjust the recording level using the record level control (MIC/DIN) ⑮. Set the REC level control (LINE) ⑯ to "MIN".

MIXING RECORDING

1. Operate as described in items 1 to 7 of "Recording from a stereo system".
2. Insert the microphones into the Microphone sockets ㉚ and ㉛ .
3. Adjust the recording level so that the pointers of Level meters ⑩ and ⑫ do not exceed 0 dB and +3 peak indicator lights occasionally at a maximum input.
   The recording level from the microphones is adjusted with the Recording level controls ⑮ ; the recording level from the stereo system (Line in sockets ㉞) is adjusted with the Recording level controls ⑯.
4. Operate as described in items 8 to 11 of "Recording from a stereo system".

Notes for recording

1. Do not use the DIN lead and US pin-type leads at the same time, or the noise may occur.
2. The DIN lead can be used only with an amplifier. Accordingly, recording and playback is not possible by connecting two tape decks with a DIN lead.

Monitoring during recording

Since the REC head and PLAY head are independent in this unit, the original sound being recorded can be monitored by changing over the monitor switch to "SOURCE" during recording, and the sound recorded on the tape can be monitored with the monitor switch changed over to "TAPE". Checking whether or not the recording level is adequate, or whether tone quality has deteriorated due to the dirty heads is possible.
There are following two ways of monitoring through the speakers:

- Set the monitor switch of the amplifier to "TAPE", and change over the monitor switch of this unit between "TAPE" and "SOURCE".
- Set the monitor switch of this unit to "TAPE" and change over the monitor switch of the amplifier between "TAPE" and "SOURCE".

PLAYBACK

1. Turn the power switch ㉜ ON and insert the tape to be played back.
2. Set the monitor switch ⑰ to TAPE.
   Set the Tape select switches ⑲, ⑳ matching the tape to be played back.
   Turn the Metal Tape switch ㊴ ON for playing Metal Tape.
   Be sure to set it to OFF, when Metal Tape is not being used.
   Be careful: When the Metal tape switch ㊴ is ON, the Tape select switches ⑲ ⑳ do not work.
3. Set the Dolby noise reduction/MPX filter switch ⑱ to "ON/MPX OFF" or "OFF" depending on whether or not the tape was recorded with Dolby NR circuit.
4. Set the auto-rewind switch ⑦ to the desired position.
5. Press the PLAY button ㉖ to start playback. Adjust volume, tone and balance with the stereo amplifier controls.
6. When it is desired to stop the tape during playback press the pause button ㉓ . Press the PLAY button ㉖ to start playing again.
7. Press the STOP button ㉔ when playing is completed. When the tape is played up to the end, operation will depend on the position of the auto-rewind switch ⑦.
   Operate this unit with the volume knob of the stereo system set to the position used when listening to broadcasts or records, and adjust to obtain the same volume using the output level adjustment knob ⑭.
   Caution: When the output level adjusting knob ⑭ is set to minimum, no sound comes out, and no sound will come out if the stereo system is operated incorrectly.

AUTO-REWIND SWITCH

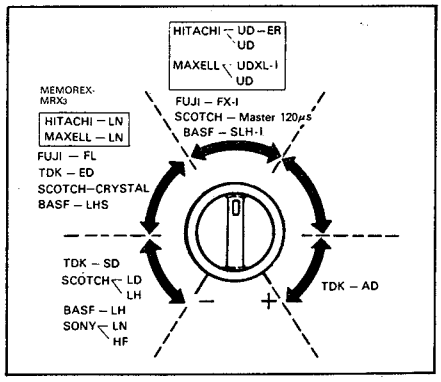
Stop, rewind or play can be done automatically depending on the position of the auto-rewind switch.
Set this switch so it is effective during recording, playing and rewinding.

OPERATION MODE	AUTO-REWIND SWITCH POSITION	AT TAPE END
Recording	**OFF**	Stop (AUTO STOP)
	STOP	Rewind to start ➡ stop (AUTO STOP)
	PLAY	Rewind to start ➡ play ➡ rewind ➡ play....(repeated)
Playback	**OFF**	Stop (AUTO STOP)
	STOP	Rewind to start ➡ stop (AUTO STOP)
	PLAY	Rewind to start ➡ play ➡ rewind ➡ play.... (repeated)
Rewind	**OFF**	Stop (AUTO STOP)
	STOP	
	PLAY	Play ➡ rewind ➡ play (repeated)
Fast Forward	**OFF**	Stop (AUTO STOP)
	STOP	
	PLAY	

BIAS FINE ADJUSTMENT KNOB

A function to fine-adjust the bias selected by the tape selector switch is provided in this unit. It can be used without any problem by setting it to its click position for normal use. With fine adjustment, however, referring to the diagram on the next page, better frequency response can be obtained. This bias fine adjustment knob operates even if the tape selector switch is set to the UD-EX (CrO_2) and FeCr positions.
At present, however, optimum bias values for these tapes are approximately the same, so setting to the center click point is sufficient. When using a tape not specified in the diagram, optimum bias values can be determined in the following way.

1. Record FM detuning noise (white noise) at approx. −10VU, changing over the monitor switch ⑰ between SOURCE and TAPE. Adjust the bias fine adjustment knob so that the tone quality with the switch set to SOURCE and TAPE is almost the same.
2. Move the bias fine adjustment knob slightly to the (+) side when the sound played back from the recorded tape is bright, and to the (−) side when it is dull, and then repeat item 1. Adjust so that the tone quality of the source sound and the sound played back from the recorded tape is almost the same.



* Even with tapes of the same brand, the tape thickness of C-60 and C-90 tapes is different, so different bias is needed.
* The bias fine adjustment knob cannot be used during playback.

FAST FORWARD AND REWIND

To advance a tape rapidly to any desired point, press the Fast forward button ㉕. To stop the tape movement, press the Stop button ㉔. In the case of Fast Forward, when the tape is wound to the end, it stops automatically regardless of the position of the auto-rewind switch ⑦.
Tape may be rewound rapidly by pressing the Rewind button ㉗.
To stop the movement, press the Stop button ㉔.
When the auto-rewind switch ⑦ is set to "PLAY" during rewind, the deck automatically enters the PLAY mode. When it is set to "STOP" or "OFF", the deck automatically enters the STOP mode.

RECORDING AND PLAYBACK USING AN EXTERNAL AUDIO TIMER

When this tape deck is used with an external audio timer, timer recording or playback at the desired time is possible.

Timer recording of radio broadcasts

1. Insert the power cord of this unit into the socket of the amplifier. (Insert the power cord of the amplifier into the socket of the timer.)
2. Set the timer to the desired time.
   (Refer to the instruction manual of the timer for setting the timer.)
3. Turn the power for the amplifier and tuner ON.
4. Operate as described in items 1 — 7 in "RECORDING", adjust the recording level and press the STOP button.
5. Set the auto-rewind switch ⑦ to OFF or STOP.
   Note: Do not set the auto-rewind switch ⑦ to "PLAY" during timer recording.
6. Set the REC side of the timer switch ㊶ to "ON".
7. Recording starts automatically at the set time, the timer operates and the power is switched on.

Timer PLAY

1. Insert the tape you desire to playback, adjust the volume knob of the amplifier to determine the level and press the STOP button ㉔.
2. Connect the timer in the same way as in the "Timer recording of radio broadcasts" and set the timer to the desired time.
3. With the PLAY side of the timer switch ㊶ set to "ON", PLAY starts automatically at the set time.

Cautions

- Do not use a cassette with its erasure prevention tab snapped. When a cassette with its tab snapped is used, the unit operates in the PLAY mode when the timer operates.
  Be careful because the chance to make a unique recording might be missed.
- Be sure to set the timer switch (TIMER) to "OFF" except for TIMER recording/playback. When the timer switch (TIMER) is set to REC or PLAY, recording or play starts automatically a few second after the power switch is turned ON.
  Be careful when the erasure prevention tab is present the previously recorded tape will be erased. Do not open/close the cassette lid for several seconds after the power is switched ON to protect the mechanism.
- Do not use timer recording or playback when you are absent for a long time.

ERASING

When a recording is being made, any sound already on the tracks is automatically erased before the new recording is made. Erasure is accomplished only when the deck is in the recording mode.
If you wish to erase a tape without making a new recording, set the Recording level controls ⑮, ⑯ at minimum, and set the Tape select switches ⑲, ⑳ or the Metal Tape switch ㊴ matching the tape to be played back. Press the PLAY button ㉖ while pressing the recording button ㉘.

MAINTENANCE

In order to keep this unit in optimum operational condition, clean the heads, capstan and pressure roller periodically with a head cleaning stick moistened in alcohol or methylated spirit. When the Eject button ㉑ is pressed, the cassette holder comes out toward you gradually. The cassette lid can be removed by lifting it while holding both of its side edges.
Never use a sharp or metallic instrument or tool for cleaning these parts. The easiest cleaning can be performed by using a Hitachi head cleaning cassette. Hitachi Ultra-Dynamic Cassettes are provided with a piece of head cleaning tape on both ends of the tape; therefore, all accumulated dirt and oxide particles are removed automatically at the beginning and the end of the tape. When Metal Tapes are recorded and played back for several hours, the tape running system must be cleaned.

Demagnetization: The head is inevitably magnetized slightly after being used for a long time. As a result, high-frequency sound may be lacking or noise may be generated. Perform demagnetization of the head occasionally with a head eraser. In this case, do not touch the tape running surface of the head directly with the metallic part of the eraser, but use the eraser after protecting the head with cloth or gauze.

CASSETTE TAPES

Recording Protection: If the plastic tabs on the rear of the cassette are punched out (a screwdriver or similar tool works well), the recordings can be protected against accidental erasure.
When only one side of the cassette is to be protected, with the blank side of the cassette towards you punch out the tab on the right. (See diagram ㊹)
Precaution: If a tape is played several times continuously, especially if a thin tape (C-90, C-120) is used, the tape might be wound too tightly on the reel and cause the tape speed to fluctuate. In order to avoid this, it is recommended to tap the cassette several times lightly against a table-top which will loosen the tape on the reel. But the tape should not be too loose. Especially after fast forwarding or rewinding a C-90 or C-120 cassette, the slack should be taken up by inserting a pencil or other object in the spindle hole and tightening the tape to prevent looping.
4-Track Recording/Playback: After recording or playing back one side of the cassette, remove the tape by depressing the Eject button ㉑ , turn the cassette over and insert it again. Then, the tape can be used again for the same recording time as the first side.

DOLBY* NR (Noise Reduction) SYSTEM

Due to the slow speed of cassette deck, tape hiss occurs. This is not audible at maximum output level but considerably degrades the playback quality of low level passage of recorded material. By using the Dolby NR system (named after the inventor), it is now possible to substantially reduce tape hiss so that it is practically inaudible during playback.

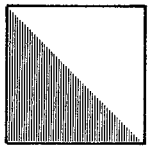
With the Dolby NR system, during recording, the level of the low passages is increased considerably; during playback these passages are reduced to their original level. Therefore, the tape hiss is also reduced by the same amount and is not audible during playback.
Before playback of a cassette, it should be ascertained if the Dolby NR/-MPX FILTER switch ⑱ is set in the proper position:

* Cassettes recorded through the Dolby NR circuit must be played back in the Dolby NR mode (if played back with normal playback equalization, the sound seems too sharp).

* Normal recordings should not be played back through the Dolby NR system (if played back with the Dolby NR equalization, the sound will seem "muddy").

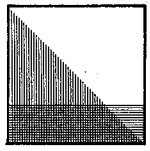
The optimum adjustment of the recording and playback calibration is important for satisfactory functioning of the Dolby NR system. This adjustment is done at factory prior to shipment using a special measuring device.

HOW THE DOLBY NR SYSTEM WORKS
Making an ordinary recording:



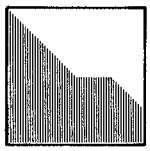
1. Music.
Music is composed of sounds of different loudness separated by intervals of silence.
Loud and soft sounds are here shown as long and short lines. The music shown by this diagram starts loud and gradually becomes very quiet.

2. Noise
Any recording tape, even of the best kind, makes a constant hissing noise when played.
At the very slow speeds and narrow track widths used in cassettes, tape noise is much more noticeable than it is in professional tape recordings, although even there it is a problem.



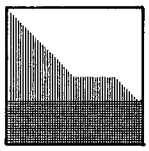
3. Music and Noise.
When a tape recording is played, noise from the tape obscures the quietest musical sounds and fills the silence when no sound should be heard at all. Only when the music is loud the noise is not usually heard; however, tape noise is so different from music that it sometimes can be heard even then.

Making a Dolby system recording:



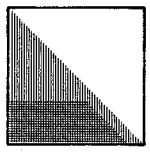
1. What the Dolby System does first.

Before the recording is made, the Dolby system "listens" to the music to find the places where a listener might later be able to hear the noise from the tape.
This happens mainly during the quietest parts of the music. When it finds such a passage, the system automatically increases the volume so that music is recorded at a higher level than it would be normally.



2. The Recording.

In a Dolby system recording, the parts of the music which have been made louder stand out clearly from the noise. As a result, Dolby system recordings sound brilliant and unusually clear even when played back without the special Dolby system circuit.



3. What the Dolby System does during playback.

When tapes are played on a high-fidelity tape deck equipped with the Dolby system circuit, the loudness is automatically reduced in all of the places at which it was increased before recording. This restores the music to its original level again.
At the same time, the noise which has been mixed with the music is reduced in level and this is by the same amount usually enough to make it inaudible.

SPECIFICATIONS

Semiconductors	ICs: 8 Transistors: 55 Diodes: 47 FET's: 2 LED's: 12
Track System:	4-track, 2-channel
Tape:	Cassette tape (C-30, 60, 90)
Tape Speed:	4.75 cm/s
Recording System and Bias Frequency:	AC bias, 85 kHz
Erasing System:	AC erase
Erase Ratio:	65 dB (at 1 kHz) or more
Frequency Response:	UD-ER (NOR): 20 Hz to 18 kHZ 30 Hz to 17 kHz (According to DIN 45 500) FeCr: 20 Hz to 18 kHz 30 Hz to 17 kHz (According to DIN 45 500) UD-EX (CrO_2): 20 Hz to 20 kHz 30 Hz to 18 kHz (According to DIN 45 500) METAL: 20 Hz to 21 kHz 30 Hz to 19 kHz (According to DIN 45 500)
S/N (Signal-to-Noise Ratio):	Dolby NR ON: 68 dB (A weighted, Reference 3% T.H.D. METAL Tape) 68 dB (According to DIN 45 500) Dolby NR OFF: 60 dB (A weighted, Reference 3% T.H.D. METAL Tape) 60 dB (According to DIN 45 500)
Wow and Flutter:	0.03% (WRMS) 0.10% (According to DIN 45 500)
Input Sensitivity and Impedance:	Microphone: 0.35mV (Suitable microphone impedance 300 Ohms to 5 kohms) Line in: 80mV 70 kohms Record/playback (DIN): 0.35mV, 4.7 kohms
Output level:	550mV or more (adjustable)
Output Load Impedance:	Line out: 50 kohms or more Record/playback (DIN): 470 kohms Headphone: 8 ohms to 2 kohms (suitable)
Distortion:	1.2% (1 kHz 0 dB)
Crosstalk:	60 dB (at 1 kHz) or more
Power (Mains) Supply:	AC 100 — 110V, 115 — 127V, 200 — 220V, 230 — 250V, 50/60 Hz
Power (Mains) Consumption:	42W
Dimensions:	16.5(H) x 43.5(W) x 25.6(D) cm
Weight:	8.2 kg

* Specifications are subject to change without notice for performance improvement.